- The total represents approximately 15% of the 2020 wastewater flow generated.

Data from the survey regarding potential water recycling projects above the base were distributed over three hydrologic regions as "planned" or "conceptual" projects. "Planned" values indicate any recycling projects that are undergoing feasibility study, preliminary design, or final design. Conceptual values reflect what survey respondents believed to be feasible in the future, but no formal studies have been undertaken. Table 6-2 presents the survey information as incorporated into DWR data for use in the "California Water Plan Update, Bulletin 160-98 Public Draft" (DWR 1998).

ESTIMATES OF CURRENT WATER RECYCLING

Although the DWR survey identified about 450 TAF of existing urban recycling projects, another survey by the SWRCB identifies only 355 TAF (SWRCB 1998).

Comparing the two sources, it appears that the SWRCB summary has identified a much smaller amount of groundwater recharge from recycling. This accounts for about 80 TAF of the difference. Additional differences may be from recycling reported to DWR that is considered "nonreportable" by the SWRCB (in-plant service water, respondents including permitted levels rather than actual levels). The difference also may be explained by the SWRCB survey including only "new water" while the DWR survey is "total water."

The July 1998 SWRCB survey is still in draft. Revised values should be available shortly and may further clarify differences.

Table 6-2. Cumulative Estimates of Water Recycling in 2020 (TAF/Year)

	TOTAL WATER RECYCLING POTENTIAL				NEW WATER SUPPLY			
	SAN FRANCISCO BAY	CENTRAL COAST	SOUTH COAST	TOTAL	SAN FRANCISCO BAY	CENTRAL COAST	SOUTH COAST	TOTAL
Base	40	44	364	615[1]	35	42	328	468[2]
Planned	101	40	640	837[1]	92	38	569	699
Conceptual	-	-	-	131	-	-	-	31
Total	-	-	-	**1,583**	-	-	-	**1,198**

[1] The difference between the total for the three hydrologic regions shown and the total for base or planned recycling projects represents projects in the Central Valley that do not generate new water supply. As previously discussed, Central Valley regions have not been included in this analysis at this time.

[2] The difference between the total for the three hydrologic regions shown and the total for base projects represents projects in the North and South Lahontan and in the Colorado River hydrologic regions already in service and providing new water supply.

Source: Draft information developed for "California Water Plan Update, Bulletin 160-98 Public Draft" (DWR, 1998).

6.4.3 ASSUMED WATER RECYCLING POTENTIAL UNDER NO ACTION ALTERNATIVE CONDITIONS

Projected levels of urban wastewater recycling under the No Action Alternative conditions assume that the base value already has been fully implemented by 2020. This would mean that existing recycling would need to increase from 485 to 575 TAF, an addition of 90 TAF. (CALFED assumes that only 75% of the difference between existing levels and the 615-TAF value shown in Table 6-2 is achieved. Most of this increment represents expansion to build-out capacity of existing recycling facilities, however, according to industry sources, it is unlikely that more than 75% will actually be achieved under the No Action Alternative scenario [MacLaggan 1998]). CALFED assumes this value to represent the incremental base value. Figure 6-2 on the following page graphically displays CALFED's assumed relationship between the values in Table 6-2 and the assumed level of recycling under the No Action and with CALFED's Preferred alternatives.

For purposes of this document, CALFED assumes that the No Action Alternative condition represents implementation of **50%** of the planned values and the incremental increase in the base value of 90 TAF. Therefore, the No Action condition assumes that **510 TAF of additional recycling** will occur (derived by taking 50% of 837 TAF from Table 6-2 and adding it to the 90 TAF incremental increase in the base value). Combined with existing level of 485 TAF, this would represent about 995 TAF of annual wastewater recycling by 2020.

New water generated from recycling under the No Action Alternative is estimated at 415 TAF (derived by taking 50% of the 699 TAF from Table 6-2 plus 75% of the incremental base recycling).

The existing levels of recycling and the anticipated No Action Alternative increment, together comprising nearly 1.0 MAF, would indicate that about 30% of the 2020 wastewater flow could be recycled regardless of the outcome of the CALFED Bay-Delta Program

.CALFED's assumption of only 50% of the planned value shown in Table 6-2 being achieved under a No Action Alternative condition is based on two influencing factors:

- The Metropolitan Water District of Southern California (MWD) recently updated their Integrated Resource Plan (IRP), which evaluates at a multitude of water supply and demand management options. Their report establishes goals for a diverse mix of local and imported water resource elements that is optimized to meet future supply reliability in a cost-effective manner. The IRP set an aggressive 2020 water recycling and groundwater recovery goal of 500 TAF per year, of which 225 TAF are already being produced (MWD 1998). This represents only about half of the sum of base and planned values for the South Coast shown in Table 6-2.

- Analysis by the WateReuse Association of California indicates that the original survey that resulted in the values shown in Table 6-2 was completed when the drought of the 1990s was still fresh in the minds of those being surveyed. Also, it appears that actual implementation of projects is much less ambitious than survey respondents may indicate (MacLaggan 1998). This discrepancy may be a result of the difference between surveying a water purveyor's staff member in charge of studying recycling potential and actually having a project brought before the purveyor's board of directors for approval.

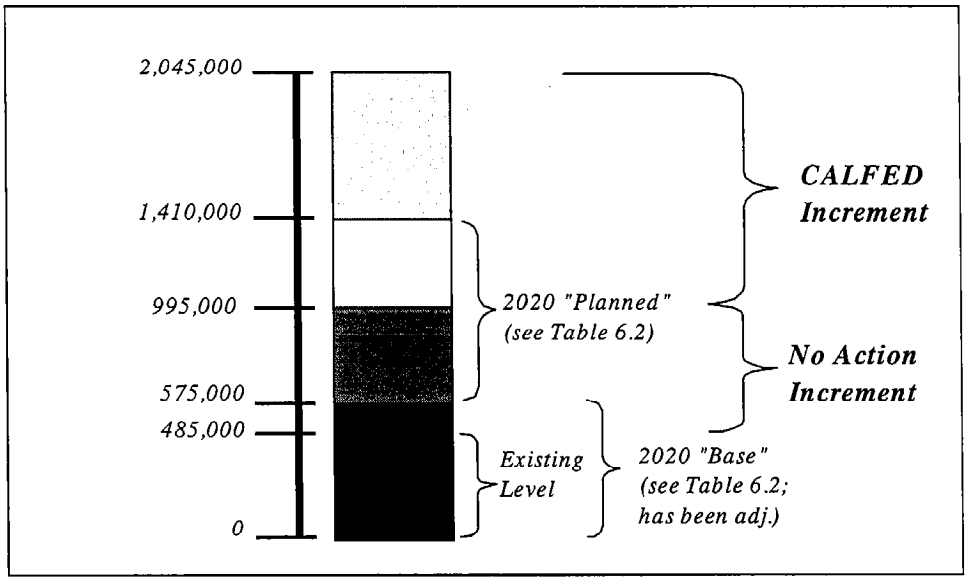

Figure 6-2. Increments of Existing and Anticipated Water Recycling
(These values are used to derive No Action and CALFED recycling levels.)

[It should be noted that the "California Water Plan Update, Bulletin 160-98" [DWR, November 1998] includes a lower level of water recycling for the South Coast Region than indicated in Table 6-2. According to DWR, other options, including resolution of the Colorado River water supply controversy and CALFED Program solutions would provide more water to this region at less cost than additional levels of water recycling. As a result only about 30% of the planned recycling potential shown in Table 6-2 for the South Coast, in addition to the South Coast's 2020 base recycling, was assumed to be implemented as part of Bulletin 160-98. However, the CALFED Program's No Action Alternative conditions do **not** include a CALFED Program solution and do not make judgement on how the Colorado River use issue is resolved. Thus, for purposes of this analysis, CALFED has assumed that 50% of the planned potential shown for the South Coast Region in Table 6-2 is included in the No Action Alternative level.)

6.5 ADDITIONAL WATER RECYCLING AS A RESULT OF THE CALFED PROGRAM

When a Bay-Delta solution is reached, it is anticipated that the actions outlined in Section 2 of this document would facilitate the implementation of the No Action Alternative levels of water recycling and probably facilitate additional levels.

For greater levels of water recycling to occur, the CALFED Program needs to provide solutions to several of the constraints discussed earlier. At a minimum, these include availability of financial support, assistance in resolving the issue of supply and demand timing, the need for regional distribution to reach a broader customer base, and improvements in source water quality at the Delta. Undertaking a stronger leadership role by state and federal governments will also aid in achieving greater levels of water recycling.

Without resolution of these issues, levels of water recycling could be expected to increase but not much beyond the identified planned levels shown in Table 6-2 (i.e., the additional 50% of the planned value **not** assumed to occur under No Action Alternative probably would be implemented with modest financial support through CALFED). The extent to which additional recycling occurs beyond this level under a Bay-Delta solution will depend on CALFED helping solve institutional and physical challenges. CALFED intends to work with local agencies to overcome these potentially limiting factors. Figure 6-2 graphically displays CALFED's assumed range of incremental improvement over No Action Alternative conditions. As indicated on the figure, CALFED assumes that, by helping overcome impediments, statewide urban water recycling could reach over 2.0 MAF annually.

6.5.1 ESTABLISHING AN UPPER LIMIT OF WATER RECYCLING POTENTIAL

To develop an upper limit of recycling potential, CALFED has assumed that the issue of supply and demand timing, and other impediments previously discussed, are solved such that their remaining presence does not impede the implementation of cost-effective water recycling projects. Thus, significantly increased levels of water recycling beyond No Action Alternative levels are possible. Given this assumption, the extent of future recycling levels depends on the future wastewater flow present in 2020 and any remaining limiting factors.

Since a CALFED Bay-Delta solution also anticipates extensive urban conservation, it can be expected that the wastewater flow generated in 2020 will be decreased comparably. The level of reduction, however, will depend on the types of conservation measures implemented and their impact on the wastewater flow (for example, changes in the type of urban landscape will affect the consumption of water but will not affect flows to a wastewater treatment plant).

For this analysis, CALFED has assumed the increment of urban conservation expected to result from a Bay-Delta solution will reduce wastewater flows by 7.5% from the anticipated 2020 No Action Alternative level (the CALFED increment of urban conservation was projected at 5-10%, with a significant portion obtained through indoor residential and CII conservation; see Section 5). Therefore, the previous estimates of a total wastewater flow of 690 TAF in the Bay Area and 2.6 MAF in the South Coast (see previous discussion in this section regarding the regional projects), will be reduced to 640 TAF and 2.4 MAF respectively; or about 3.1 MAF combined.

Of this total wastewater flow, the No Action Alternative condition is expected to already have resulted in about 1.0 MAF of water recycling annually (the sum of the base and 50% of the planned values in Table 6-2). Subtracting this amount from the total wastewater flow potential of 3.1 MAF leaves about 2.1 MAF of treated wastewater still being discharged to coastal waters.

It is impossible to say whether water recycling projects ever could be implemented to achieve 100% recycling, but it is unlikely that such would occur. Many factors work against this, including:

- The distance between potential customers and water recycling sources;
- Physical restrictions of existing treatment plants (space, inflow capacity);
- The limitation of storage;
- Infeasible cost or technology limitations;
- Poor water quality of incoming waste stream (high salinity levels); and
- Other impediments, such as public or market perceptions, local laws or ordinances, a bias in favor of new supply development over recycling, and other institutional/ challenges.

Even assuming that the issue of supply and demand timing is addressed, these factors are still likely to limit the incremental recycling of the remaining 2.1 MAF.

Considering the factors listed above, **CALFED has assumed for this analysis that a maximum of 50% of the remaining 2020 wastewater flow could realistically be recycled.** Fifty percent of 2.1 MAF is about 1.05 MAF annually. When combined with the No Action Alternative water recycling increment of 510 TAF, the expected increase in total water recycling **above existing levels** would be over 1.5 MAF annually.

When existing recycling programs are included, the sum would represent about 65%, or two-thirds, of the total 2020 wastewater flow—slightly over 2.0 MAF. Additional indirect potable reuse, direct potable reuse, expansion of treatment plants, and technological advances all could eventually drive the level of recycling up even further.

CALFED has assumed that, based on the No Action Alternative values, the new water supply generated from this additional increment of total water recycling is about 790 TAF annually (75% of 1.05 MAF). This increment would be new water available for allocation to other beneficial uses. Table 6-3 shows how these quantities may be distributed among the three hydrologic regions, using No Action Alternative values as a basis.

To allow for this level of total water recycling, the various impediments listed directly above and at the beginning of this section, as well as the supply and demand timing issue all must be adequately resolved. Otherwise, the CALFED Program would result only in facilitated implementation of levels much lower than this.

As a result, a broad range of water recycling potential is expected for the CALFED Program increment; ranging from 460 TAF of additional recycling up to 1.05 MAF. In terms of a percentage of the total wastewater flow, the increment would range roughly from **30 to 65% of the projected wastewater flow.**

6.6 SUMMARY OF STATEWIDE WATER RECYCLING POTENTIAL

The table below provides a summary of the potential water recycling estimated to occur both under the No Action Alternative and CALFED Program conditions. The combined total water recycling potential represents an upper range of 65% recycling of the total 2020 wastewater flows. **Note that these values are absent the existing recycling levels of 485 TAF.**

Table 6-3. Summary of Incremental Statewide 2020 Water Recycling Potential (TAF/Year)

	NO ACTION INCREMENT (INCREMENTAL "BASE" PLUS "PLANNED")		CALFED PROGRAM INCREMENT	
	TOTAL WATER RECYCLING	NEW WATER SUPPLY	TOTAL WATER RECYCLING	NEW WATER SUPPLY
San Francisco Bay	53	48	50-170[2]	40-130[2]
Central Coast	35	33	30-70[2]	20-50[2]
South Coast	392	349	350-810[2]	260-610[2]
Total	**510[1]**	**455[1]**	**460-1,050**	**345-790**
Combined water recycling potential (No Action Alternative + CALFED increment)			970-1,560[1]	800-1,245[1]

[1] The three hydrologic region values do not add up to the total because of recycling that occurs in other areas of the state (see Table 6-2).

[2] These regional values were prorated from the total based on the distribution of the No Action Alternative regional values. (For example, for the No Action Alternative increment, the South Coast represents about 77% of the total new water supply. Therefore, the South Coast's CALFED increment is assumed to be 77% of the CALFED increment total).